KOOCANUSA SAMPLING PROGRAM OVERVIEW 2019

Koocanusa – sampling program for the USA portion of the reservoir for 2019								
Sample medium/ constituent(s)	**Sampling frequency/ number of sites**	**Preparation of QAPPs/SAPs**	**Collection/ processing of samples**	**Sample shipping**	**Laboratory analysis**	**QA review and upload of data to WQX Portal**	**Comments**	**Method Notes / Clarifying Comments**
Nutrients	Monthly; 3 sites	ACOE	ACOE	ACOE	ACOE	ACOE	Frequency rationale: established baseline monitoring	
Water chemistry (anions, cations, total metals)	Monthly; 3 sites	ACOE	ACOE	ACOE	ACOE	ACOE	Frequency rationale: established baseline monitoring	
Particulate Se	4x/yr (based on hydrograph- e.g.; May; late June-early July; Aug/Sept); 2 sites (Border, Forebay), 2 depths	ACOE	ACOE	Teck	Teck	ACOE	Should be collected at the same time as dissolved Se. Frequency rationale: recommended baseline sampling until Se waste stream stabilizes, then frequency could be reduced.	• Following Libby Dam: Kootenai River and Lake Koocanusa Water Quality Sampling and Analysis Plan 2019 • Teck providing sampling bottles/coolers, shipping and laboratory analysis
Dissolved Se	Monthly; 3 sites, 2 depths	ACOE	ACOE	ACOE	ACOE	ACOE	Same time as particulates. Frequency rationale: established baseline monitoring.	• Following Libby Dam: Kootenai River and Lake Koocanusa Water Quality Sampling and Analysis Plan 2019
Continuous depth profiles (1-meter intervals)	Monthly; 3 sites	ACOE	ACOE	N/A	N/A	ACOE	Same time as dissolved/ particulate. Rationale: consistent with USGS and data was valuable. Rationale for US border location – continue consistency with long-term data set; enable Clean Water Act assessment decisions by MDEQ. Frequency rationale: recommended baseline sampling until Se waste treatment stabilizes, then frequency could be reduced.	
Zooplankton taxonomy and Se	May, July and September at LIBBOR, LIBTMC and LIBFB	ACOE	ACOE	ACOE	ACOE	ACOE	Frequency rationale: consistency with baseline for past 2 years. Could be altered to a frequency of 4x/year. Sampling method adjusted to match Canadian sampling method.	• Samples will be collected by vertical tow from a depth of 10 m using an 80 µm mesh net. The net will be 30 x 90 cm and equipped with a high efficiency Wisconsin reduction collar (20 cm). Collect 10g of sample.
Surface and benthic macroinvertebrates	2x/year May/September aligned with fish tissue timing – sampling at Tenmile (8 sites) and Border (8 sites) per 2018 QAPP locations (Appendix C)	Teck	Teck	Teck	Teck	Teck	Frequency rationale: Captures 2 seasons, spring and fall. Requesting surface tows – consistent with past sampling and shoreline sampling is not effective on US side due to steep sandy banks. Note: two different sampling methodologies will be used for two components of the Reservoir under this item, due to differing conditions on the Canadian side of the border.	• Based on QAPP - 2018INVERTQAPP.pdf • No taxonomy – sampling for Se concentration only • Benthic tissue collected by petite ponar and sample picked/composited/analyzed consistent with QAPP • Surface invertebrate tissue samples paired sites with benthic locations – sample net TBD - handling/analysis consistent with QAPP • Complete EDDs and tissue analysis per QAPP
Fish	Annual MT-FWP at Rexford fish population gillnet site (1 site); in May 14/15 and September, timing based on reservoir level/spring onset and includes location near Elk River mouth as well	FWP/Teck	FWP / Teck	Teck	Teck	Teck	Frequency rationale: 2x/yr (spring and fall) consistent with Teck sampling and consistent with FWP/DEQ past sampling efforts. Location consistent with past efforts.	• Based on 2018 QAPP • 8 individuals (targeting mature females) per species for tissue – filet, and gonads for spring spawners in spring, filet plus gonads for fall spawners in fall • For northern pikeminnow targeting 15 mature females 30-65 cm total length and include GSI • Collect supporting data in field consistent with 2018 QAPP

Koocanusa – sampling program in Canadian portion of reservoir for 2019								
Sample medium/ constituent(s)	**Sampling frequency/ number of sites**	**Preparation of QAPPs/SAPs**	**Collection/ processing of samples**	**Sample shipping**	**Laboratory analysis**	**QA review and upload of data to WQX Portal**	**Comments**	**Method Notes / Clarifying Comments**
Water temperature and conductivity	Thrice per year (April/June/August) - Elk River mixing CTD transects	Sampling per the BC ENV accepted study design, submitted April 2018, and approval letter June 8, 2018 (note additional sampling maybe added subsequent to approval e.g., Environmental Monitoring Committee (EMC) advice	Teck	Teck	Teck	Teck	• Distributed in reservoir from north of the Elk River inlet arm down to the border • Based on temperature and conductivity	• Used to inform mixing and contribution of Elk River
Water chemistry	Thrice per year (April/June/August) at 5 sites; WQ sample and vertical profile (unless riverine conditions)		Teck	Teck	Teck	Teck	• Depth integrated water sample with vertical profiles following WQ monitoring plan • Sites are proximal to mouth of Sand Creek, mouth of Elk River, mouth of Gold Creek, RG_KERRRD and RG_GRASMERE	
Sediment quality	Once (August) near RG_KERRRD and RG_GRASMERE		Teck	Teck	Teck	Teck	• Locations based on existing WQ stations u/s and d/s of Elk River input • 5 replicates from each site for chemistry	• Sampling using petite ponar (0.023 m^2 sample area) (or steel spoon for littoral) and 3 grab samples from the top 3 cm of sediment composited to make a replicate
Particulate Se	Thrice per year (June, July and Sept) at 1 site; RG_DSELK);		Teck	Teck	Teck	Teck	• Dissolved concentrations to be collected concurrently	
Zooplankton	Twice (June & August) near RG_KERRRD and RG_GRASMERE		Teck	Teck	Teck	Teck	• Locations based on existing water quality stations u/s and d/s of Elk River input • 5 replicates from each site; tissue chemistry and taxonomy samples to be collected	• Sample collection for taxonomy based on vertical hauls of a 19cm wide 60µm mesh net – 3 hauls will be composited to make a replicate • Sample collection for metals analysis based on vertical hauls of 30 cm wide 80 µm from top 10 m and whole water column (2 samples) with 10 hauls composited to develop the sample
Benthic Invertebrate – tissue chemistry	Twice (April & August) near RG_KERRRD and RG_GRASMERE		Teck	Teck	Teck	Teck	• Captures both riverine and reservoir systems up and downstream of Elk River inflow • One integrated sample per site for tissue chemistry	• Samples (2 – 1 at each site) composited from 20 petite ponar grabs at each site, washed/sorted using 500µm mesh and preferentially selecting chironomids for 0.5 g WWT sample
Fish – tissue chemistry	• Once (May or June) at three sites for Peamouth Chub, Northern Pikeminnow and Redside Shiner • Thrice (May, June and August) for sportfish • Redside shiner and northern pikeminnow selenium studies*		Teck	Teck	Teck	Teck	• Sites are proximal to mouth of Sand Creek, mouth of Elk River and mouth of Gold Creek • Peamouth Chub, Redside Shiner and Northern Pikeminnow - ovaries and muscle from 10 females (lethal sampling) • Sportfish - muscle plugs from up to 8 individuals per species of captured (non-lethal sampling) • Redside shiner and northern pikeminnow studies – collection of tissue and gonad samples from fish in the reservoir during spawning period supporting laboratory work	• Fish weighed, measured, examined for external deformities – for fish lethally sampled gonad and liver weight, sex and internal deformities will be recorded • Redside shiner study moving into 2nd year with both lab and field egg collections • Northern pikeminnow study is under development for field work starting later in spring
Fish – tissue chemistry	MT-FWP fish population gillnet site downstream of Elk River inputs – Canada site; September		FWP/Teck**	Teck	Teck	Teck	• Frequency rationale: consistent with FWP/DEQ past sampling efforts. Location consistent with past efforts.	• 8 individuals (targeting mature females) per species for tissue – filet plus gonads for fall spawners
Fish - recruitment	Once (August) at three sites for Redside Shiner only		Teck	Teck	Teck	Teck	• Sites are proximal to mouth of Sand Creek, mouth of Elk River and mouth of Gold Creek • 100 YOY from each location for EEM endpoints	

*proposed and subject to fish collection / transportation approvals; ** MT FWP – Montana Fish Wildlife and Parks conducting single sample event in September, Teck processing/analyzing captured fish only